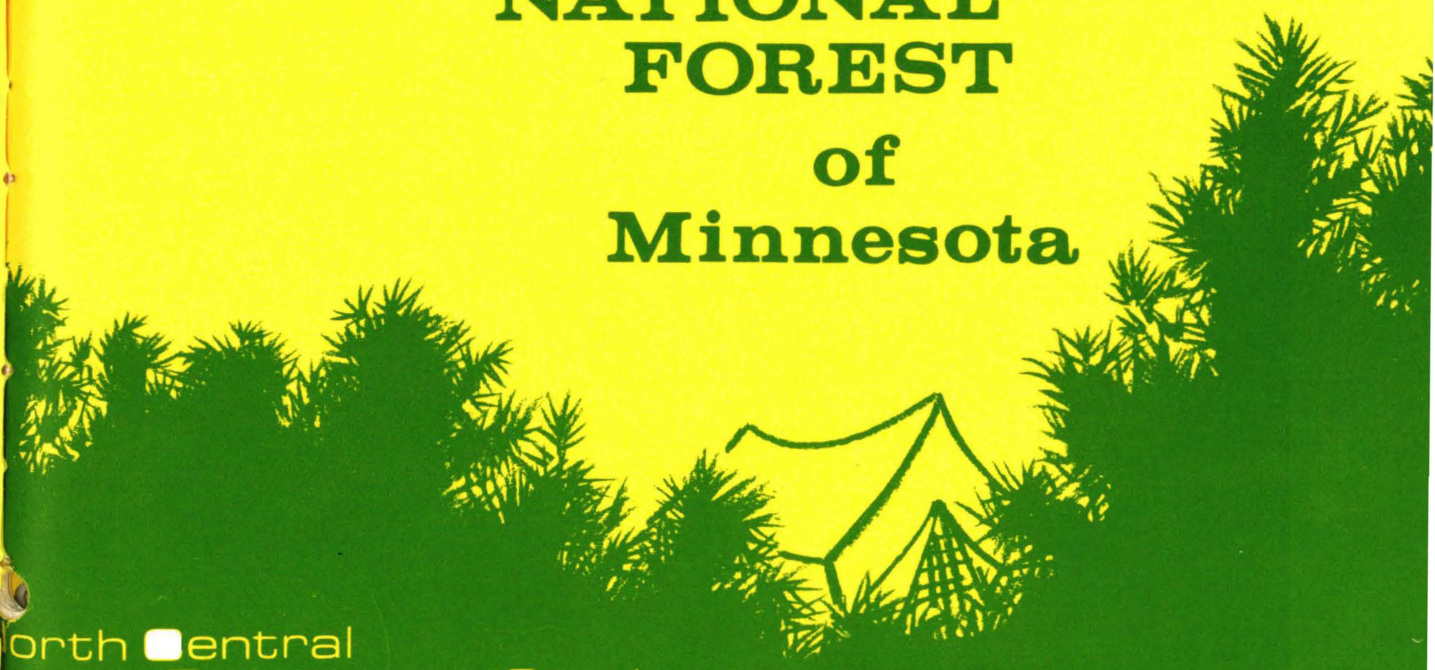
USDA Forest Service
Research Paper NC-60
1971

LIBRARY FILE COPY

DAVID W. LIME

Factors Influencing Campground Use in the SUPERIOR NATIONAL FOREST of Minnesota



North Central
Forest Experiment Station
Forest Service · U.S. Department of Agriculture

Dr. Lime is a Geographer for the Station at the Headquarters Laboratory in St. Paul, Minnesota. The Station is maintained in cooperation with the University of Minnesota.

The author gratefully acknowledges the guidance and encouragement of Dr. David G. Arey, University of Pittsburgh, and Dr. Robert C. Lucas, Intermountain Forest and Range Experiment Station, Missoula, Montana.

North Central Forest Experiment Station
D. B. King, Director
Forest Service — U.S. Department of Agriculture
Folwell Avenue
St. Paul, Minnesota 55101

(Maintained in cooperation with the University of Minnesota)

CONTENTS

	Page
Study Area: The Superior National Forest	1
Methods	2
Sampling Campground Use	2
Interviewing Campers	2
Results	3
Campground Use in 1967	3
Campground Use in 1968 Compared to 1967	4
Factors Associated with the Intensity of Campground Use	5
The Campground Selection Process	10
Validation by Campers of Factors From Distribution of Use Analysis	13
Implications for Management	16
Direction of Future Research	17
Literature Cited	18

Factors Influencing Campground Use In The Superior National Forest Of Minnesota

David W. Lime

Managers of public recreation lands must meet the persistent demands of an ever-increasing recreating public during the coming decades. Decisions, once made, will be irreversible for the most part. It is therefore essential that decisions be made with a clear understanding of the consequences to future visitors. Understanding these consequences in terms of their effect on environmental quality and recreational land use calls for a keen comprehension and interpretation of the interrelations of people, resources, location, and design.

Auto campgrounds vary greatly in amount of use. While some are frequently full, others receive only light use. Reasons for this uneven distribution of users are not well understood.

The objective of the study was to identify factors which influenced the distribution of visitors among auto campgrounds of the Superior National Forest during the peak of the camping season.

Meeting this objective required: (1) determining how intensity of use varied among campgrounds; (2) correlating the distribution of users with attributes of the campgrounds; (3) interviewing campers to learn what factors influenced their choice of a particular camping area; and (4) ascertaining if these factors were the same as the campground attributes under (2) above (Lime 1969b).

STUDY AREA: THE SUPERIOR NATIONAL FOREST

The Superior National Forest is located in northeastern Minnesota and is bounded by Ontario on the north and Lake Superior to the southeast. Composed of about 3 million acres, of which approximately one-third is the Boundary Waters Canoe Area (BWCA), the Forest stretches about 130 miles from east to west and 70 miles from north to south (see map, pages 8 and 9).

Recreational use of the campgrounds is primarily vacation-oriented rather than weekend or transient. The auto campgrounds are not located near the major through-travel arteries of northeastern Minnesota. Route 61, a through route between Duluth and Ontario following the shoreline of Lake Superior, passes along the eastern portion of the Forest, but this route is served by several State park campgrounds. State highway routes 1 and 169 probably serve as the major artery for camping traffic in and out of the Forest (see map). Few other auto campgrounds (State, municipal, or private) exist in northeastern Minnesota to compete with facilities in the Superior National Forest.

A primary recreational attribute of the study area is its water. In 1968, 30 percent of the Forest's use (in visitor-days) was water activities.[1] More than 10 percent of the gross acreage is water. This represents over 2,000 lakes 10 acres or larger in size, and totals nearly 315,000 acres of water. The streams, which are characteristically short with an abundance of falls and rapids, total more than 1,500 miles in length.

There are 36 auto campgrounds in the Superior National Forest; all but two (because of isolation from the others) were included in this study (see map). The evolution of the campgrounds dates to the 1920's. Several facilities were developed from parking lots used by fishermen. Increased development took place in the 1930's by the Civilian Conservation Corps but was meager until the late 1950's when the Forest Service began rehabilitating older campgrounds and developing new ones.

These programs have not been completed and differences in the degree of development

[1] *Canoeing, boating, fishing, and swimming. Recreation files, Superior National Forest, Duluth, Minnesota.*

between some campgrounds are extreme. Site and location conditions also vary widely: 15 of the campgrounds have no source of water except lake or stream; the number of campsites per campground ranges from one to 69 with 15 campgrounds containing more than 18 sites; 29 are located adjacent to lakes and the remaining seven are on streams; some have been utilized for more than 40 years, the newest only 4; 18 require overnight camping fees; only one has flush-toilet facilities; several are located adjacent to a paved main State route while the most remote is more than 30 miles from the nearest paved road; some have striking vegetation and scenery such as cliffs, falls, and rapids, while others exhibit sparse and trampled vegetation, low relief, and quiet water; and one campground is 5 miles from a town, the most remote more than 28 miles.

METHODS

Sampling Campground Use

In 1967 the 34 campgrounds were sampled during a 35-day period between August 1 and Labor Day. Campground occupancy was tallied for 16 randomly selected dates – 10 weekday nights (Sunday through Thursday) and six weekend nights (Friday and Saturday) – after 7 p.m. in the evening on the assumption that most campers would be within their respective campgrounds at this time. A check made on a particular night was a record of use for the following day.

Estimates of the total number of group-nights[2] of use at each campground during the survey period were derived from the sample. For each campground each "weekday day" was checked twice during the 5-week period. Two Mondays were checked, two Tuesdays were checked, and so on. Similarly, each weekend day was checked three times during the 5-week period. An estimate of total use was determined by multiplying the total number of group-nights by the inverse of the respective sampling rate – 1.67 for weekend values and 2.50 for weekday figures.

Total group-nights of use at each campground was then converted to percent occupancy by dividing the total number of group-nights by the total number of possible group-nights during the sample period. Possible group-nights was the number of designated campsites times the length of the survey period – 35 days.

The survey was repeated in six of the campgrounds during the same time period in 1968 to determine if there were differences between years.

Interviewing Campers

The time period for interviewing campers during 1968 closely paralleled the inventory of use in 1967. Interviews were conducted between July 23 and Labor Day, 1968. Each campground was visited three times – twice on weekdays (Monday through Friday) and once on weekends.

The sample size at each camping area was determined onsite by selecting at random a portion of all occupied units. Campgrounds with many sites occupied were sampled at a lower rate than those with few sites occupied. All questioning and recording was conducted by the author. The group spokesman was self-selected. On questions involving opinions, other interested members of the party also were probed. Approximately 25 minutes were required to conduct each interview; 248 interviews were completed. There were no refusals. If the people in the sample site were gone when the interviewer called, he made several return trips to the site to interview them. If these campers were not interviewed, another randomly selected occupied unit was sampled. The substitution rate was under 10 percent.

A weighting procedure was devised to control bias for different sampling rates on weekends and weekdays, and variability in onsite sampling. These adjustments were found to have little effect on the summation of responses. Thus, data are presented in the unweighted form.

Although the length-of-stay bias was recognized (Lucas 1963, Wagar and Thalheimer 1968), questionnaire responses deliberately were not corrected on this basis. A decision to occupy a campground unit 10 days was felt to be twice as important as one to occupy a campsite for only 5 days. Thus, the analyses of campers' responses were left in visitor-days (or group-days).

[2] *A group-night represents the use of one campsite for one night.*

RESULTS

Campground Use in 1967

Campground use was sampled for comparative purposes during the peak of the camping season rather than to measure total summer visitation. The data revealed considerable variation in use among camping areas for the three time periods (table 1). For the overall survey period some places were used more than five times as much as others, the same ratio reported in a study of a few camping areas near the BWCA in 1961 (Lucas 1964).

For ease of comparison campgrounds were arbitrarily grouped into four size classes. Striking variations existed in the intensity of use both between and within these groups.

For the entire survey period, occupancy averaged 42 percent of capacity, but individual campgrounds ranged from 19 to 104 percent (fig. 1). Smaller campgrouunds (fewer than 11 campsites) were generally more intensively used. Some campgrounds were used more than three times as intensively as others in the same size class.

On weekends occupancy averaged 52 percent of capacity (fig. 2). Individual campgrounds varied from 23 to 123 percent. Again small campgrounds received more intensive use, but exceptions are readily apparent. As before, there was a large range within size classes and some camping areas were used more than three times as much as others.

Predictably, weekday occupancy averaged below weekend occupancy, or 36 percent of capacity (fig. 3). Variations in the intensity of use between individual campgrounds was extreme, from 12 to 96 percent. Occupancy by size classes varied most during the weekday period. Some campgrounds averaged over six times as much occupancy as others in the same size class.

The following tabulation gives another view of the wide variation in use between camp-

Table 1.—Rankings of the intensity of auto campground use for the overall survey period, weekends, weekdays (Aug. 1 to Sept. 5, 1967)

Overall survey period			Weekends		Weekdays	
Campground name	Campsites	Occupancy	Campground name	Occupancy	Campground name	Occupancy
	Number	Percent		Percent		Percent
Moose Lake	8	104	Moose Lake	123	Moose Lake	96
Lake Jeanette	9	88	Lake Jeanette	109	Lake Jeanette	79
Hogback Lake	5	80	Kawishiwi Lake	104	Hogback Lake	72
Devil Track Lake	18	72	Hogback Lake	100	Devil Track Lake	71
Kimball Lake	9	72	Kimball Lake	91	Trails End	66
Kawishiwi Lake	5	70	Temperance River	85	Kimball Lake	64
Lake One	6	68	Lake One	83	Dumbell Lake	64
Trails End	33	67	Devil Track Lake	77	Ox-Bow	63
Dumbell Lake	5	67	Bouder Lake	75	Lake One	62
Bouder Lake	2	64	Poplar River	75	Bouder Lake	60
Ox-Bow	3	64	Stony Point	74	Stony Point	60
Stony Point	5	64	Dumbell Lake	73	Sawbill Lake	59
Sawbill Lake	50	62	Cascade River	72	Iron Lake	58
Temperance River	8	59	Trails End	70	Kawishiwi Lake	56
Fall Lake	48	58	Whiteface Reservoir	69	Fall Lake	55
Iron Lake	6	57	Sawbill Lake	68	Temperance River	49
Poplar River	4	55	Lichen Lake	67	Poplar River	48
Fenske Lake	14	49	Ox-Bow	67	Isabella River	42
Cascade River	3	44	Fall Lake	64	Fenske Lake	42
Isabella River	11	44	Fenske Lake	61	Baker Lake	40
Baker Lake	4	42	Iron Lake	53	South Kawishiwi River	38
South Kawishiwi River	34	37	Portage River	50	Cascade River	33
Lichen Lake	1	33	Isabella River	49	Crescent Lake	30
Portage River	3	33	Baker Lake	46	Flour Lake	29
Crescent Lake	40	32	Cadotte Lake	41	Portage River	27
Flour Lake	43	30	Crescent Lake	38	East Bearskin Lake	27
Whiteface Reservoir	57	30	South Kawishiwi River	35	Ninemile Lake	27
Ninemile Lake	19	29	Flour Lake	35	Birch Lake	23
East Bearskin Lake	44	27	Echo Lake	35	Two Island Lake	23
Birch Lake	38	24	Ninemile Lake	34	Echo Lake	17
Two Island Lake	36	23	East Bearskin Lake	28	Whiteface Reservoir	14
Echo Lake	29	22	McDougal Lake	27	Lichen Lake	14
Cadotte Lake	27	20	Birch Lake	25	McDougal Lake	12
McDougal Lake	20	19	Two Island Lake	23	Cadotte Lake	12

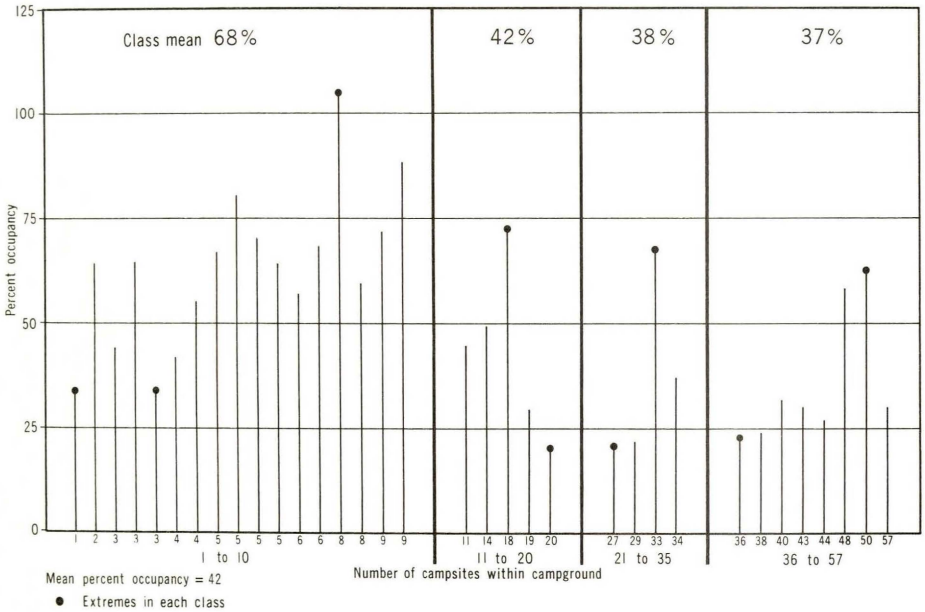


Figure 1.—Variation in campground occupancy: overall survey period, 1967 (Aug. 1-Sept. 5).

grounds.

Number of campgrounds	*Overall survey period*	*Weekends*	*Weekdays*
Over 2/3 full	9	18	5
1/3 to 2/3 full	13	12	16
Under 1/3 full	12	4	13

Of the 18 camping areas averaging over two-thirds full on weekends, four were filled beyond their designed capacity. Of those averaging over two-thirds full for the overall survey period, only one was full beyond capacity. On weekdays, none were overfilled.

Of the 647 individual campsites in the 34 campgrounds, 30 percent averaged fewer than three nights of use during the survey period. Twelve percent were never used even though the survey included the Labor Day weekend (fig. 4). On the other hand, 17 percent of the campsites averaged over 75 percent full, and 6 percent averaged over 90 percent full (fig. 5).

Although the intensity of use generally increased at each location on weekends, differences between weekends and weekdays were not great. The difference in use between weekends and weekdays was less than 20 percent for 22 of the 34 campgrounds. This substantiated the assertion that use of the Forest's campgrounds was primarily vacation-oriented. Furthermore, the relative rankings of percent occupancy for these two time periods were nearly the same.

Campground Use in 1968 Compared to 1967

The six camping areas[3] as a whole experienced about a 10-percent increase in total use between the two years. A comparison of the percentage of total use that each campground received for both years indicated that camp-

[3] *Birch Lake, Fall Lake, Fenske Lake, Lake One, Moose Lake, and South Kawishiwi River Campgrounds.*

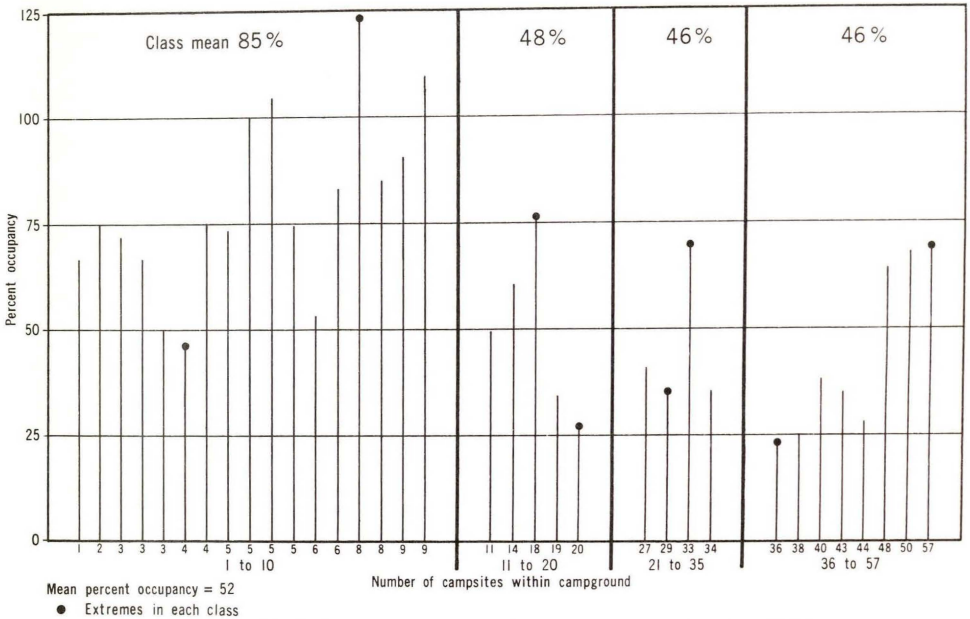


Figure 2.—Variation in campground occupancy: weekends, 1967 (Aug. 1-Sept. 5).

ground use remained essentially stable. This meant that the percent occupancy observed in 1967 was a reliable index of use for at least a 2-year period. This assumption gains additional support from observations of similar use intensities at several of these same camping areas in 1961 (Lucas 1964).

Factors Associated with the Intensity of Campground Use

FACTORS CONSIDERED

Relations were determined between the intensity of campground use (percent occupancy) and 74 variables that the author felt might affect intensity of use. These variables were divided into three groups: locational, natural, and manmade environments of the campgrounds.

The location factors were the proximity of the campgrounds to: (1) travel routes, paved roads, (2) towns, (3) other recreation facilities, and (4) their degree of "northness" within the Superior National Forest itself as well as their nearness to Canada.

The natural environment factors included both land resources (vegetation and topography) and water resources (type and recreational quality) and their potential for outdoor activities.

Factors of the manmade environment included: (1) the facilities and services provided (including activity potentials, conveniences for comfort, and number of individual campsites), (2) the year of opening and whether an overnight fee was charged, (3) number of individual campsites on the waterfront, (4) the number of campsites suitable for trailers, and (5) the spacing and quality of the screening between campsites.

ANALYSIS OF VARIABLES SINGLY

Because of the wide variation in campground size, the statistical variance in percent occupancy during the sampling period was greater, hence, less reliable in camping areas with few campsites than in areas with many sites. As a result it was necessary to weight the raw occupancy data for each campgrouund on the basis of its size or number of individual campsites.

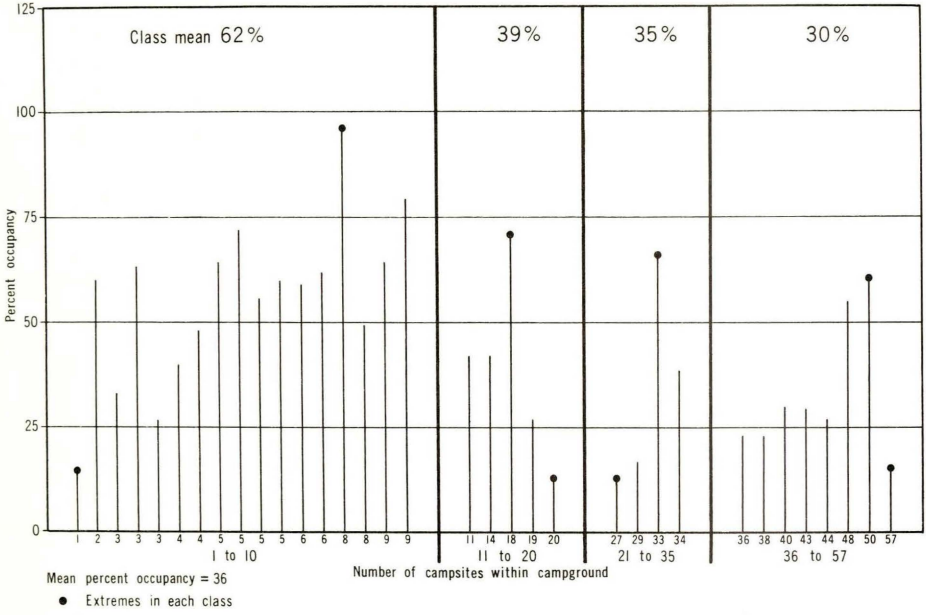


Figure 3.—Variation in campground occupancy: weekdays, 1967 (Aug. 1-Sept. 5).

Analysis was made using percent occupancy for the entire 1967 survey period as the dependent variable and the campground factors as independent variables. Only a few factors were significantly related (0.05 level) to percent occupancy.

F-520784

Figure 4.—About one-third of the Forest's individual campsites were seldom if ever used.

A map of campground use (see map) shows occupancy rates at the various locations. Two location factors were significantly related to use: (1) campgrounds "up north," especially at five places on major access points into the BWCA, and (2) camping areas somewhat removed or "remote" from general concentrations of people and main roads but relatively close to a few basic camper-needs (groceries, watercraft rentals, and bait shops). The location of the three camping areas which were filled beyond 80 percent of capacity shows no obvious reasons for their rates of use. One might also have expected that places closer to Duluth and the Iron Range cities would have received more intensified use because of their proximity to people and the force of convenience. This was not indicated, however.

Five factors of the natural environment in and around the campground resulted in higher rates of occupancy – (1) a reputation for good fishing, (2) the presence of coniferous trees, (3) deep water offshore, (4) bedrock outcrops, and

F-520783

Figure 5.—About a quarter of the campsites were occupied at least three-fourths of the time.

(5) cliffs. Two attributes of the cultural environment were significantly related to use: (1) camping areas with many waterfront campsites, and (2) older, well established campgrounds. The data (though statistically nonsignificant) suggested that higher rates of use were also related to campgrounds with few campsites and those not highly developed (without such facilities as a swimming beach, nature trail, picnic ground, and boat launching ramp).

MULTIPLE REGRESSION

Since many of the variables seemed intercorrelated, they were analyzed in combination. A weighted, backward stepwise regression[4] employing 25 variables yielded only three which were statistically significant (0.05 level) in describing percent occupancy: (1) the percentage of waterfront campsites, (2) the reputation of the lake or stream adjacent to the campground for fishing, and (3) the length of time the campground had been open.

The resulting regression equations showed that these three variables accounted for 65 percent of the variation in occupancy among all 34 campgrounds and 77 percent among 29 campgrounds[5]. For the 29 campgrounds the final equation was:

$$Y = 26.82 + 6.61X_1 - 0.32X_2 + 0.47X_3{}^*$$

where,

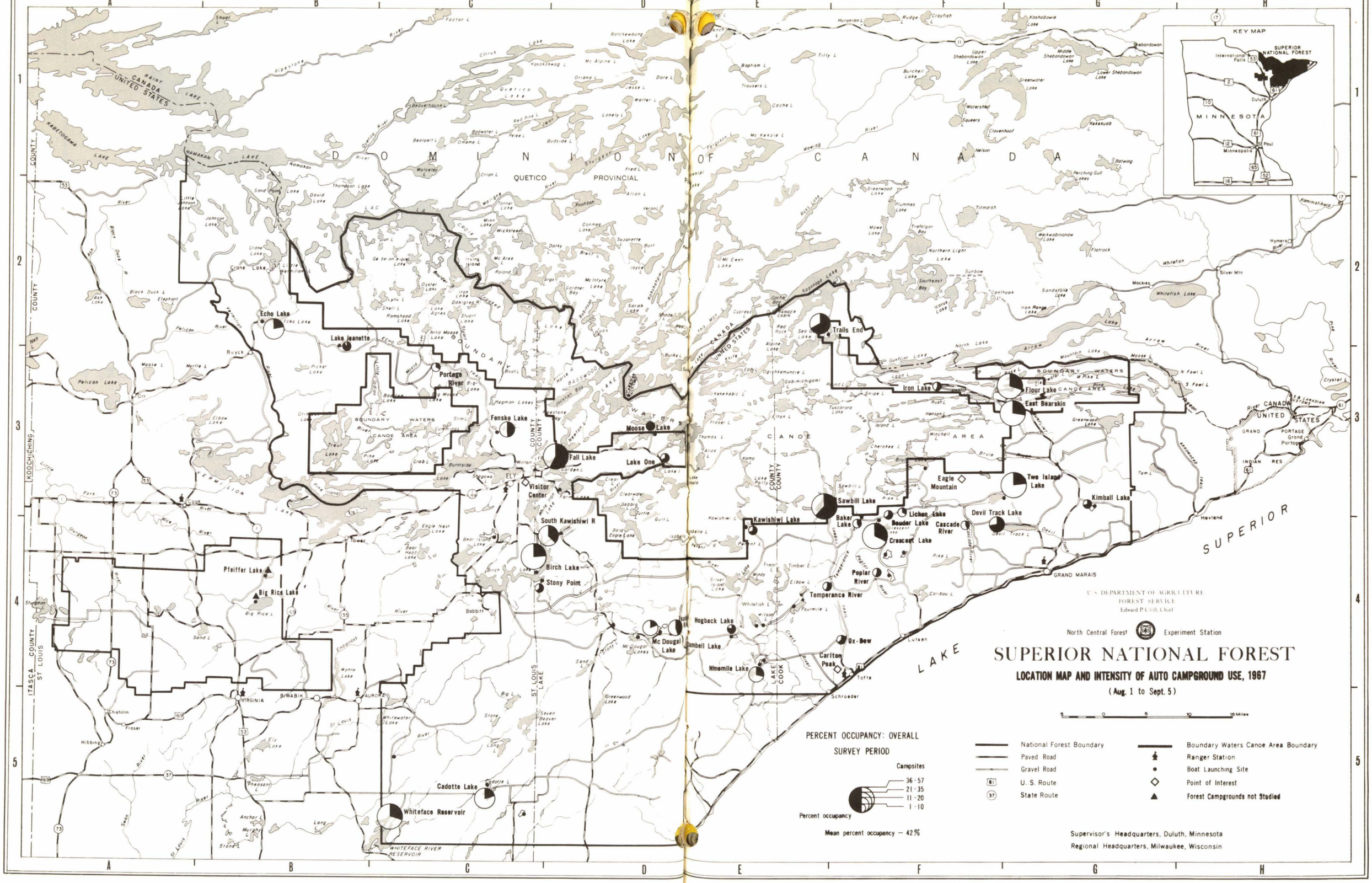
- Y = Percent occupancy for the entire survey period
- X_1 = Number of fish species the water body adjacent to the campground was well known for
- X_2 = Calendar year initially opened to public camping**
- X_3 = Percentage of the individual campsites which were waterfront campsites.

[4] *The program, UMST580 Stepwise Regression, deletes least significant variables one at a time based on a fixed probability level. The program was developed for the Control Data Corporation 6600 Computer, University of Minnesota.*

** Regression was also run using an arc-sine transformation of percent occupancy with little difference in the final result.*

*** Only the last two digits of the calendar year were used in the analysis.*

[5] *Examination of scatter diagrams and simple correlations of variables suggesting possible relationships for all 34 campgrounds indicated that five of the camping areas seemed somewhat "different" in their relationships toward variables associated with greater percent occupancy. This group included those five campgrounds located on major access points into the BWCA — Moose Lake, Lake One, Trails End, Sawbill Lake, and Fall Lake. All received high use but generally did not possess many traits of other heavily used camping areas.*


KEY MAP
SUPERIOR NATIONAL FOREST
International Falls
Duluth
MINNESOTA
Minneapolis
St Paul
CANADA
UNITED STATES
D O M I N I O N O F C A N A D A
RAINY LAKE
KABETOGAMA LAKE
NAMAKAN LAKE
QUETICO PROVINCIAL
BOUNDARY WATERS CANOE AREA
VERMILION LAKE
LAC LA CROIX
SUPERIOR LAKE
Echo Lake
Lake Jeanette
Portage River
Fenske Lake
Moose Lake
Fall Lake
Lake One
Visitor Center
South Kawishiwi R
Birch Lake
Stony Point
Pfeiffer Lake
Big Rice Lake
Mc Dougal Lake
Cadotte Lake
Whiteface Reservoir
WHITEFACE RIVER RESERVOIR
Trails End
Iron Lake
Flour Lake
East Bearskin
Eagle Mountain
Two Island Lake
Kimball Lake
Sawbill Lake
Baker Lake
Lichen Lake
Boulder Lake
Crescent Lake
Cascade River
Devil Track Lake
Kawishiwi Lake
Poplar River
Temperance River
Hogback Lake
Dumbell Lake
Ninemile Lake
Ox-Bow
Carlton Peak
GRAND MARAIS
Hovland
Schroeder
Lutsen
VIRGINIA
BIWABIK
AURORA
ELY
COOK
TOFTE
ITASCA COUNTY
ST LOUIS COUNTY
KOOCHICHING COUNTY
LAKE COUNTY
CANOE AREA
U.S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
Edward P Cliff, Chief
North Central Forest Experiment Station
SUPERIOR NATIONAL FOREST
LOCATION MAP AND INTENSITY OF AUTO CAMPGROUND USE, 1967
(Aug. 1 to Sept. 5)
0 5 10 15 Miles
PERCENT OCCUPANCY: OVERALL SURVEY PERIOD
Campsites
36 - 57
21 - 35
11 - 20
1 - 10
Percent occupancy
Mean percent occupancy — 42%
National Forest Boundary
Paved Road
Gravel Road
U. S. Route
State Route
Boundary Waters Canoe Area Boundary
Ranger Station
Boat Launching Site
Point of Interest
Forest Campgrounds not Studied
Supervisor's Headquarters, Duluth, Minnesota
Regional Headquarters, Milwaukee, Wisconsin

The multiple correlation coefficient (R) was 0.88. Analysis of variance showed significance beyond the 0.01 level. The resulting $R^2 = 0.77$, indicated that 77 percent of the variance in percent occupancy of the 29 camping areas was predictable from these three campground attributes. Each independent variable was statistically significant at the 0.05 level with percentage of waterfront campsites also significant at the 0.01 level.

The percentage of waterfront campsites was by far the most useful predictor in the model. This is seen in the tabulation below of the percent contribution of each variable to the variance in percent occupancy (Harp 1967).

Variable	*Contribution Percent*
Percentage of waterfront campsites	84.16
Number of fish species water body was well known for	8.19
Calendar year initially opened to public camping	7.65
Total	100.00

Although the added effect of the other two attributes was statistically significant, their contribution was small. In fact, when the percentage of waterfront campsites was considered alone, it accounted for 65 percent of the variation in percent occupancy between campgrounds. The statistical significance of water as an attraction of campgrounds is consistent with other studies (Beardsley 1967, Shafer and Thompson 1968, Lucas 1970).

The pattern of residuals from the regression equation was examined to see if any other attributes could be identified which were associated with percent occupancy. Camping areas were thus pinpointed which had rates of usage not reasonably representative of campground characteristics employed in the model. No common attribute that was measured helped to explain why these places received unpredictable use.

Because most of the variables originally considered did not ultimately contribute to the prediction of occupancy does not mean that they might not have been useful if measured or scaled in other ways. Also, specific values for some of the variables had little range among campgrounds. Undoubtedly, there are esthetic and other elements of the environment which have been overlooked or cannot be readily measured or classified. Perhaps some scale of "campground remoteness" would have been useful in which various elements of distance and level of campground development could have been incorporated.

The Campground Selection Process

Although the previous analysis was a useful method for identifying campground attributes that were associated with rates of occupancy, it must be remembered that they may not be the cause of why people went where they did to camp. Many campers, for example, may select a place to camp because of other reasons. To better understand the processes of selection behavior, campers were asked to discuss why they chose one campground rather than another.

The basic question asked of campers was: Why did you choose to camp in this campground rather than some other campground in the Superior National Forest? Probing was directed to answering morespecific questions. Which factors, if any, of the site and its location affected your decision? What other factors are important? These may include haphazard search or chance, word-of-mouth communication, and habit – returning to the same place.

Additional questioning sought to identify visitors' previous camping experience, knowledge of alternative campgrounds, degree of trip planning, sources of information about campgrounds, place of residence, preferences for individual campsites in a campground, and preference for campground size.

BACKGROUND OF CAMPERS

The results showed that most visitors had planned their outing in advance and nearly all knew *where* they were going as well as *why*. Many campers had previous experience with the recreation opportunities of northeastern Minnesota. Eighty-nine percent of all campers had been in the area before; 65 percent had auto camped in the Superior National Forest before; and, 48 percent of all parties had previously visited the campground in which they were interviewed.

Visitors were fairly well informed about the availability of other campgrounds in the Forest, but there were notable exceptions. The mean number of campgrounds they were familiar with was eight. Twenty-nine percent of the campers were aware of more than 10 locations while 31 percent were familiar with three or fewer places.

Perhaps surprising, 80 percent of all campers (97 and 78 percent, respectively, for weekenders and vacationers[6]) selected a campground *before* they left home. For 78 percent of all campers, the particular camping area in which they were interviewed was their main destination.

Parties also were asked if they had considered any alternative destinations in the process of selecting a campground. Thirty-seven percent had, and most (74 percent) of this group had considered only one or two other locations.

Forest Service literature and personnel were not particularly influential in assisting people find a campground (table 2). As some other studies have shown, word-of-mouth advertising and "we just saw the sign and pulled in" were the principal ways campers found out about the camping area in which they were interviewed.

Table 2.—Response of campers to "How did you first learn about this campground?"

Answer	Respondents	
	Number	Percent
Interpersonal Communication		
Friends or acquaintances	93	38
Forest Service personnel	15	6
Local businessmen	20	8
Printed Literature		
Forest Service recreation map	30	12
Campground atlas or directory	18	7
Gasoline company road map	11	4
Local chamber of commerce map or county recreation map	4	2
Other Reasons		
Saw entrance sign and pulled in	42	17
Live or have lived nearby, familiar with the area	8	3
Don't remember	3	1
All other reasons	4	2
Total	248	100

[6] *Vacationers differed from weekenders in that they were on extended trips of more than 2 days.*

Home for most of the campers was not northeastern Minnesota. Sixty-six percent were from Minnesota (of this total, over 64 percent were from the Twin Cities metropolitan area), with Illinois the second most popular State (17 percent). Campers traveled an average of 382 miles from their places of residence — 420 miles and 140 miles respectively for vacationers and weekenders.

REASONS FOR CHOOSING A CAMPGROUND

Basic data were obtained from open-ended questions in which respondents were asked to explain why they had selected that particular campground. Campers were given ample time to state freely any factors which came to mind. They were then asked to identify the three most important reasons from among all those mentioned (table 3).

Reasons in the locational category were varied. The importance of being close to other recreation attractions largely reflected campers' desires for being near lakes and streams for fishing, boating, and canoeing. Accessibility reasons were equally divided between a desire for remoteness and easy access. On the whole, few campers chose a place because it was close to home or to stores.

Fishing was the element of the natural environment reported most often by campers (fig. 6). Campsites, both in sight of water (waterfront), and well screened from neighbors, were the most frequently noted cultural aspects. A recent on-site survey of Adirondack campers identified the importance of campsites near the water (Shafer 1969). Lucas' (1970) survey of National Forest campers in Michigan found that visitors prefer well-spaced campsites.

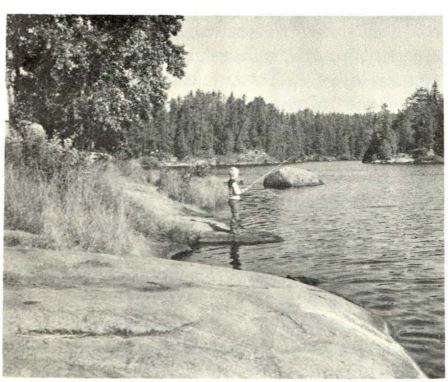
In the human-related category, the feeling of wilderness or uncrowdedness ranked first followed by interpersonal communication (advice from acquaintances or local businessmen). Although the type of outdoor environment that campers were seeking was classified as a human-related reason it also may involve each of the other three categories of reasons (locational, natural, and cultural). Wilderness and uncrowdedness could be applied to: places well removed from major highways and towns, camping areas farther "up north," especially scenic settings,

Table 3.—Response of campers to "Among all the reasons you mentioned, what are the three most important reasons you chose this campground?"

Type of reason	User category		
	Vacationers N = 214	Weekenders N = 34	All campers N = 248
	Percent	Percent	Percent
Locational			
Accessibility (either remoteness or proximity to roads or travel route)	18	6	16
Nearness to services[1]	10	0	8
Nearness to primary residence[2]	3	29	7
Nearness to other recreation attractions	19	26	20
Natural Environment			
Vegetation (tree cover)	1	0	1
Fishing quality[1]	40	62	42
Wildlife	1	9	2
Geography of surroundings (terrain, water body)[1]	16	3	14
General scenery	5	3	4
Cultural Environment			
Facilities--comfort-based (drinking water, toilets)	7	0	6
Facilities--activity-based (swimming beach, nature trail)[1]	7	18	9
Absence of a fee	2	0	2
Campsite design--view of water	14	12	13
Campsite design--campsite quality (privacy, size, parking space)	14	15	14
Number of campsites	9	0	8
Human-related			
Type of outdoor atmosphere sought (wilderness and/or uncrowdedness)	29	29	29
Interpersonal communication	20	15	19
Unplanned circumstances	10	6	9
Nearness to persons visiting in area	5	3	4
Habit	8	9	8
Lack of awareness of other campgrounds	8	3	7
All others	1	0	1

1/ Chi-square test indicates differences among vacationers and weekenders significant at 0.05 level.

2/ Vacationers differed significantly from weekenders at the 0.001 level.



F-520782

Figure 6.—The opportunity for fishing was the most frequently reported reason campers gave for choosing a particular campground.

locations with a low level of development, small campgrounds, and individual campsites well screened from neighbors.

WEEKENDERS ARE DIFFERENT FROM VACATIONERS

There were few interviews with weekenders (34 of 248 interviews) because most of the campground use was from vacationers. These few interviews with weekenders weaken statistical comparisons with vacationers but some trends are evident, however (table 3). As anticipated, weekenders more frequently reported the convenience of a campground's location to their home as important. They cared little for being near services but did indicate a greater concern for finding a camping area with a swimming beach. Fishing also rated higher with weekenders.

Vacationers gave many of the same reasons as weekenders, but differed in wanting to be close to paved roads and stores. However, most camping parties on an extended stay came well supplied with the basic necessities for the duration of their visit. Vacationers also more frequently noted aspects of the geography of the surrounding area than did weekenders – particularly lake characteristics and the potential for visiting a chain of lakes without portaging.

FOUR TYPES OF SELECTION AMONG VACATIONERS

Vacationers (214 interviews) were studied to categorize campers on the basis of how they selected a campground. Campers were grouped by their awareness of the camping alternatives in the Forest. Four groups were identified.

1. The *haphazard* group (19 percent) planned the least in selecting campgrounds, were familiar with only a few alternatives, and had only limited camping experience in the Forest. Selection of a campground was attributed either to unplanned circumstances, or a general lack of awareness of alternative campgrounds.

2. The *experienced* group (44 percent), extensively planned their selection, displayed considerable camping experience, and were the most familiar with alternative sites. In selecting a camping area, they were the most discriminating of the four groups. As such, they showed greater awareness of the campground resources and consequently had the most definitive motives for their selections.

3. The *inexperienced* group (27 percent) were newcomers to the Forest. They had little knowledge of other places, but many planned their selection. Their campground choices were strongly affected by the knowledge and advice of others. Because of this their reasons were similar to those of the experienced group.

4. The *habitual* group (10 percent) was somewhat less familiar with other places than the experienced choosers. They had made the most trips to the Forest of any group, however, and repeatedly came back to the same place. Although they had thoroughly planned their selection and reported clearcut reasons for them, their motives were less well defined compared to the experienced group.

Validation by Campers of Factors From Distribution of Use Analysis

In this section an attempt is made to determine if the factors from the distribution of use analysis actually explained why recreationists went where they did. All 248 interviews were treated as a group since the distribution of use analysis in 1967 was based on aggregate use during the entire survey period.

WATERFRONT CAMPSITES

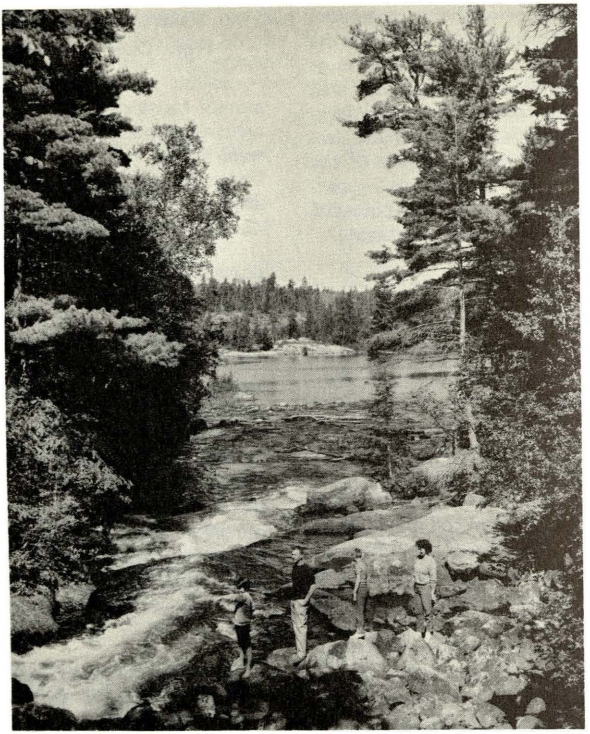
The importance of a waterfront campsite from the multiple regression analysis was borne out by the interviews. Campers emphatically supported a desire to camp within sight of a water body (waterfront) when asked, "If none of the sites had been occupied when you first arrived, which one would you have selected, and why?" Obtaining a waterfront campsite was by far the most common reason for selecting a campsite (table 4). Seventy-seven percent of all campers who selected some campsite mentioned this aspect of campground design. Only 14 parties had no preference for a campsite.

Table 4.—Response of campers who had a preference for a campsite to "If none of the sites had been occupied when you first arrived, what would be the reasons for your selection?"

Type of reason	Respondents
	Percent[1/]
Campsite design--near the waterfront	77
Campsite design--site-area quality (size, aspect, level)	31
Campsite design--screening (people, noise, prevailing winds, dust, shade)	24
Facilities--comfort-based (close to wood, toilets, drinking water)	15
Campsite design--spur quality (level, wide, long)	10
Facilities--activity-based (close to beach or launching ramp)	8
Habit, used this campsite more often in past than others	4
Bedrock, boulders, falls, or rapids present	3
Large trees present	2
Terrain characteristics	2
Shoreline characteristics	1
Type of trees predominating (pine or birch)	1
Potential for seeing wildlife	1

1/ Of the 234 respondents, many gave more than one reason.

Ninety-one percent of the campers who preferred a waterfront site did so because of the view (fig. 7). Many also wanted a watercraft



F-502645

Figure 7.—Many campers said they preferred to camp close to the water. Nearly all of them gave "the view" as the reason.

close to their camp for easy access. Others liked the openness of such campsites and indicated that this permitted breezes to act as a partial insect control.

It is interesting to speculate why so many campers noted the view of the water as a desirable feature in selecting a campsite. One answer might be that large differences in local relief are not common in northeastern Minnesota. Also, most of the area is heavily forested. Therefore, the visitor has few opportunities to obtain a sense of space or perceive distance, aside from those views afforded by the presence of water. Although considerable research has documented the lure of water as an attraction for water-based activities, little evidence is available to suggest what it is about the visual aspects of water that appeals to people.

Some parties rejected a campground either because all available waterfront campsites were filled, or they had been to the camping area before and knew it had few such sites. Thirty-seven percent of all campers rejected a campground on this trip. Of these, 24 percent reported that the lack of a waterfront campsite was important in their decision.

Waterfront campsites may cease to be an effective indicator of occupancy if use in the Forest increases to the point where there are not enough of these campsites to fill the demand. Less than half of the Forest's campsites are classified as waterfront sites (301 of 647). In the 1967 use survey, waterfront sites averaged 60 percent occupancy compared to 25 percent for other sites.

FISHING OPPORTUNITIES

Visitors to northeastern Minnesota placed great emphasis on fishing as an attraction of the area and its campgrounds. However, the importance of fishing as found in the distribution of use analysis was not validated by camper interviews. Campers' reasons for choosing a campground were compared for locations that were "known" for fishing versus those that were not. In *both* instances, fishing was the most frequently reported reason for picking that particular campground among all reasons noted.

Although fishing quality was influential as a reason why campers went to heavily used places, it similarly was important to campers who went to lightly used places. The fact that both camper groups stressed the importance of fishing in their selection is probably explained in part by the fact that *all* of the water bodies adjacent to the campgrounds had *some* fishing potential. Moreover, due to the relatively high level of experience of campers, many of them probably knew of "hot spots" in some of the waters which had been classified as "not well known for fishing."

CAMPGROUND AGE

The length of time that a camping area had been open to the public was significant in predicting the intensity of campground use, but the users themselves did not say that it was important to them. The relationship between the year it was opened and the percentage of campers who were familiar with each location was determined. Although there was a slight tendency for campers to be somewhat more familiar with older places, the relationship was not statistically significant. In other words, the data did not support the contention that older campgrounds generated greater word-of-mouth advertisement and subsequently produced a greater intensity of use.

As with the fishing variable, the age of the campground (year opened) made a statistically significant contribution to the explained variance; yet this contribution was relatively small. Apparently, it was largely a chance occurrence (1 chance in 20) that several older facilities received unusually intensive occupancy during the survey period.

NEARNESS OF CAMPGROUNDS TO THE BOUNDARY WATERS CANOE AREA

The use analysis indicated that camping areas farther north in the Forest received more intensive use, especially those on access points into the Boundary Waters Canoe Area. But interviews at 10 such locations showed that substantial numbers of the parties apparently had no great motivation to be there. Many felt that they had been in "the wilderness" some time before reaching its administrative boundary. For the most part they were day-users and their penetration into the BWCA was not deep. Many of these parties could have obtained a "wilderness" experience (for them) in developed camping areas not adjacent to the BWCA. If recreational opportunities in other parts of the Forest were better known to them, many of them could be satisfied elsewhere (Lime 1969a).

CONIFER TREES

Some researchers have hypothetized that the type of trees may influence where people go to recreate (Frissell and Duncan 1965, Klukas and Duncan 1967). Although conifer tree cover was significantly associated with a higher intensity of campground use, there was little evidence that this or any other type of vegetation actually influenced visitors' choices (table 4). Most campers were primarily concerned with being able to see the water, having a spacious and level site, and being well screened from neighbors.

CAMPGROUND SIZE

Generally, small campgrounds were more intensively used than large ones but the relationship was not strong. Of the campers who mentioned size as a reason for selecting a particular camping area, most preferred a small one with fewer than 15 campsites (table 3).

Campers were asked how many camping spots would be ideal in a campground providing they did not have to worry about getting one. Only 10 percent felt that size was not important to them and that any size would be fine. A large proportion (43 percent) stated that size was not really important as long as the campsites were well spaced, screened, and reasonably private from one another. About an equal number (47 percent) felt that campgrounds should not

have more than 20 or 25 campsites. Most of these campers also thought that campsites should be well spaced and reasonably private (fig. 8). This diversity of desires regarding campground size has been shown by others (Lucas 1970, Wagar 1963).

F-520785

Figure 8.—The majority of campers felt that individual campsites should be well spaced, screened and reasonably private from one another.

IMPLICATIONS FOR MANAGEMENT

Results from earlier studies indicate many similarities regarding the use of auto campgrounds) Burch 1964, Love 1964, Beardsley 1967, Shafer and Thompson 1968, Shafer 1969, Cordell and Sykes 1969, Lucas 1970). These include the wide disparity in use both among and within camping areas, the importance of scenery or landscape variability, the significance of water as an attraction, some caution in overexpanding campgrounds, the essential role of diversity in campground planning and development, the attraction of spacing and privacy between individual campsites, and the dominance of word-of-mouth advertising.

Although the Forest Service is apparently satisfying most of their auto campground clientele, several findings point out promising areas for policy change or reevaluation of management goals.

At present it appears that simply locating a campground adjacent to a lake or stream in northeastern Minnesota is not enough; visitors' desires for a view of the water from their campsite are legitimate and real indeed. This calls for a compromise in campground planning; to preserve and protect the lakeshore and at the same time provide users with a view of the water. This can be done by judicious placement of campsites in which topography and vegetation thinning techniques are given adequate attention in landscape design.

There is a definite need to provide a variety of different sized campgrounds. Although there was acceptance by many visitors for large facilities, provided measures are taken to ensure a reasonable degree of privacy between individual units, there also was support for small places as well (less than 20 or 25 campsites). It would appear to be a mistake not to include both types of campgrounds in management's overall plan for future development.

Forest Service literature has had only a minor influence on how campers found out about various campgrounds. More information in the campgrounds giving the location of other camping areas, policies and regulations, and the location of nearby services and recreation attractions probably would be appreciated by many visitors. Maps of the Forest are provided in campgrounds where a fee is collected, for example, but other distribution schemes could be devised.

Efforts might also be expanded to distribute more information through several communication media – the State of Minnesota, chambers of commerce, local businessmen, radio and television stations, and others. Such efforts might help distribute use more evenly among facilities and enhance satisfaction by making campers more aware of what was available elsewhere to meet their needs and desires.

The study showed that substantial numbers of campers in campgrounds on the periphery of the BWCA had no great motivation to enter the canoe country at all. As visitor numbers grow in this unique area, management may need to

limit use. One way is to direct some visitors away from its borders to other locations in the Forest.

The desire to see this National Forest left wild or wilderness-like was emphasized by many visitors. Only a very few wanted to see these campgrounds become modernized (flush toilets, running water, or electricity) or highly developed (swimming beaches, concessions, or playgrounds.)

DIRECTION OF FUTURE RESEARCH

These findings cannot adequately describe patterns of use or perceptions of visitors for all other periods of use – the spring fishing season or fall fishing and hunting seasons, for instance. The manner of use during other seasons is potentially very different from that observed during the summer. Generalizations concerning the year around camping social system would be a mistake and should be reserved until additional information is forthcoming. The results are especially relevant for the summer, however, because the study period covered August, the *peak* of the camping season. It is for this crucial heavy use period that planning and development of campgrounds should be designed.

The findings of this study cannot necessarily be applied to other National Forests. However, the methodology and some of the assumptions employed could be tested in additional situations. A logical next step would be to test these research techniques and to compare the results of this study with studies on the other seven National Forests in the Lake States (Michigan, Wisconsin, and Minnesota).

Now that some insight has been obtained about how people select a camping area, all the campgrounds in the Forest could be studied in more detail. This would permit an analysis of campground use based on types of users rather than an aggregate use alone. In this way it would be possible to determine if certain categories of people go to certain kinds of campgrounds and how this affects the distribution of use among campgrounds. For example, did campers who were influenced by the advice of other people induce higher rates of use at some locations?

Another important question is how stable are patterns of use from year to year? This research and Lucas' (1964) indicate that they are stable, but patterns of use could be updated at regular time intervals to see if present trends continue.

Analysis of trends could also be continued to determine the degree to which people's motives and attitudes change over time. Campers should be segregated into meaningful user groups – weekenders versus vacationers, by type of sleeping accommodations, by type of choosers, and perhaps others.

The influence of other peoples' advice on patterns of use and user satisfaction deserves more study. Is the flow of information between the informant and the potential user accurate and satisfying? What did the informant not tell him about the facility that he would like to have known? Was he informed about only one place or about several alternatives?

A better understanding of "habit" as an influence on leisure-time behavior would be desirable. It might have influenced action in some people more than they realized or would readily admit. Drawing this reason out of people might take more probing than simply asking them to explain why they went where they did to camp.

The influence of road signs on patterns of use is another topic which could be explored. Recent research has suggested that signs do make a difference in where people go to recreate but definitive conclusions are lacking (Brown and Hunt 1969).

Research designed to thoroughly evaluate the desirability and potential for establishing visitor information centers in selected metropolitan areas would also be beneficial. Urban information centers could assist visitors in more efficient trip planning and achieve more uniform use patterns among campgrounds.

Another unanswered question relates to the distribution of visitors *within* campgrounds. Why are some campsites in a campground much more intensively used than others? Obviously, the

drawing power of a campground per se is closely related to the drawing power or attractiveness of its individual campsites. The importance of individual units on patterns of use has been paramount in this study, but additional probing would be desirable.

How prevalent is "noncampground" camping, and why do people camp in places other than the Forest's maintained campgrounds? Frequently they just pull off on the shoulder along a gravel road. Others congregate at the end of dead-end roads or in parking lots at boat launching sites. How do these visitors "fit" into the camping social system of the Superior National Forest?

LITERATURE CITED

Beardsley, Wendell. 1967. Cost implications of camper and campground characteristics in central Colorado. USDA Forest Serv. Res. Note RM-86, 7 p., illus. Rocky Mountain Forest & Range Exp. Sta., Fort Collins, Colo.

Brown, Perry J., and Hunt, John D. 1969. The influence of information signs on visitor distribution and use. J. Leisure Res. 1(1): 79-84.

Burch, William R., Jr. 1964. Two concepts for guiding recreation management decisions. J. Forest. 62 (10): 707-712.

Cordell, Harold K., and Sykes, C. K. 1969. User preferences for developed-site camping. USDA Forest Serv. Res. Note SE-122, 6 p. Southeastern Forest Exp. Sta., Asheville, N. C.

Frissell, S. S., and Duncan, Donald P. 1965. Campsite preference and deterioration in Quetico-Superior canoe country. J. Forest. 63(4): 256-260.

Harp, Harry H. 1967. Use of marginal R^2 and partial r^2 in a multiple regression analysis. Agr. Econ. Res. 19: 103-110.

Klukas, Richard, and Duncan, Donald P. 1967. Vegetation preferences among Itasca Park visitors. J. Forest. 65(1): 18-21.

Lime, David W. 1969a. Wilderness-like recreation opportunities adjacent to the Boundary Waters Canoe Area. Naturalist 20(1): 36-41.

Lime, David W. 1969b. A spatial analysis of auto-camping in the Superior National Forest of Minnesota: models of campground selection behavior. (Ph. D. thesis on file at Univ. Pittsburgh.) 285 p.

Love, L. Dudley. 1964. Summer recreational use of selected national forest campgrounds in the central Rocky Mountains. USDA Forest Serv. Res. Pap. RM-5, 23 p., illus. Rocky Mountain Forest & Range Exp. Sta., Fort Collins, Colo.

Lucas, Robert C. 1963. Bias in estimating recreationists' length of stay from sample interviews. J. Forest. 61(12): 912-915.

Lucas, Robert C. 1964. Recreational use of the Quetico-Superior area. USDA Forest Serv. Res. Pap. LS-8, 50 p., illus. Lake States Forest Exp. Sta., St. Paul, Minn.

Lucas, Robert C. 1970. User evaluation of campgrounds on two Michigan National Forests. USDA Forest Serv. Res. Pap. NC-44, 15 p., illus. N. Cent. Forest Exp. Sta., St. Paul, Minn.

Shafer, Elwood L., Jr. 1969. The average camper who doesn't exist. USDA Forest Serv. Res. Pap. NE-142, 27 p., illus. Northeastern Forest Exp. Sta., Upper Darby, Penn.

Shafer, Elwood L., Jr., and Thompson, Roger C. 1968. Models that describe use of Adirondack campgrounds. Forest Sci. 14(4): 383-391.

Wagar, J. Alan. 1963. Campgrounds for many tastes. USDA Forest Serv. Res. Pap. INT-6, 10 p., illus. Intermountain Forest & Range Exp. Sta., Ogden, Utah.

Wagar, J. Alan, and Thalheimer, Joel F. 1968. Computer programs for weighting length-of-stay and other visitor characteristics. USDA Forest Serv. Res. Note INT-79, 12 p. Intermountain Forest & Range Exp. Sta., Ogden, Utah.

SOME RECENT RESEARCH PAPERS OF THE NORTH CENTRAL FOREST EXPERIMENT STATION

Tree Improvement Opportunities in the North-Central States Related to Economic Trends, A Problem Analysis, by David H. Dawson and John A. Pitcher. USDA Forest Serv. Res. Pap. NC-40, 30 p., illus. 1970.

Relation Between the National Fire Danger Spread Component and Fire Activity in the Lake States, by Donald A. Haines, William A. Main, and Von J. Johnson. USDA Forest Serv. Res. Pap. NC-41, 8 p., illus. 1970.

Thinning and Fertilizing Red Pine to Increase Growth and Cone Production, by John H. Cooley. USDA Forest Serv. Res. Pap. NC-42, 8 p., illus. 1970.

The Impact of Estimation Errors on Evaluations of Timber Production Opportunities, by Dennis L. Schweitzer. USDA Forest Serv. Res. Pap. NC-43, 18 p., illus. 1970.

User Evaluation of Campgrounds on Two Michigan National Forests, by Robert C. Lucas. USDA Forest Serv. Res. Pap. NC-44, 15 p., illus. 1970.

System Identification Principles in Studies of Forest Dynamics, by Rolfe A. Leary. USDA Forest Serv. Res. Pap. NC-45, 38 p., illus. 1970.

Skiing in the Great Lake States: The Industry and the Skier, by William A. Lueschner. USDA Forest Serv. Res. Pap. NC-46, 42 p., illus. 1970.

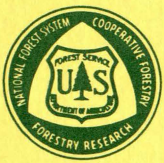
Proceedings of the Ninth Lake States Forest Tree Improvement Conference, August 22-23, 1969. USDA Forest Serv. Res. Pap. NC-47, 34 p. 1970.

A Water Curtain for Controlling Experimental Forest Fires, by Von J. Johnson. USDA Forest Serv. Res. Pap. NC-48, 7 p., illus. 1970.

Wilderness Ecology: A Method of Sampling and Summarizing Data for Plant Community Classification, by Lewis F. Ohmann and Robert R. Ream. USDA Forest Serv. Res. Pap. NC-49, 14 p., illus. 1970.

ABOUT THE FOREST SERVICE . . .

As our Nation grows, people expect and need more from their forests — more wood; more water, fish, and wildlife; more recreation and natural beauty; more special forest products and forage. The Forest Service of the U.S. Department of Agriculture helps to fulfill these expectations and needs through three major activities:



- Conducting forest and range research at over 75 locations ranging from Puerto Rico to Alaska to Hawaii.
- Participating with all State forestry agencies in cooperative programs to protect, improve, and wisely use our Country's 395 million acres of State, local, and private forest lands.
- Managing and protecting the 187-million acre National Forest System.

The Forest Service does this by encouraging use of the new knowledge that research scientists develop; by setting an example in managing, under sustained yield, the National Forests and Grasslands for multiple use purposes; and by cooperating with all States and with private citizens in their efforts to achieve better management, protection, and use of forest resources.

Traditionally, Forest Service people have been active members of the communities and towns in which they live and work. They strive to secure for all, continuous benefits from the Country's forest resources.

For more than 60 years, the Forest Service has been serving the Nation as a leading natural resource conservation agency.